

## PATENT ABSTRACTS OF JAPAN

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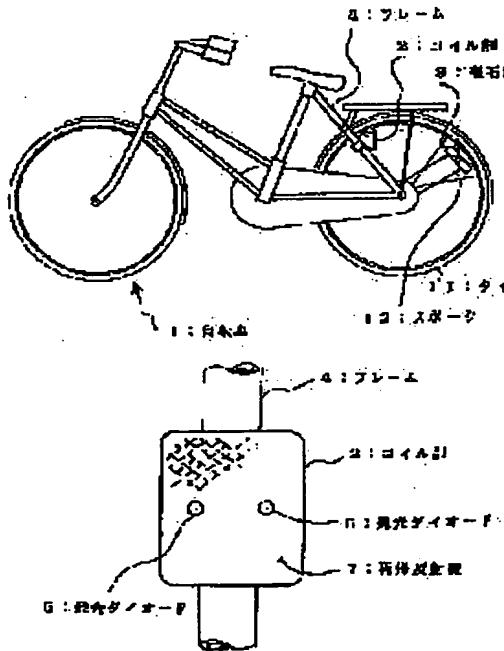
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## (54) LIGHTING FIXTURE FOR BICYCLE



## (57) Abstract:

PURPOSE: To prevent the happening of an accident during the traveling at night by fixing a magnet to a wheel, and lighting a light emitting diode with the electromotive force generated by the magnet and a coil having an iron core, which is fixed to a body frame.

CONSTITUTION: A coil part 2 having an iron core is fixed to a frame 4 of a bicycle, and on the other hand, a magnet part 3 is fixed to a spoke 12 of a wheel. At the time of rotating wheels, a magnetic circuit is formed in the magnet part 3 and the coil part 2 respectively to generate the electromotive force in the coil part 2. For, example, a light emitting diode 5 provided in the rear surface of the coil part 2 is lighted by this electromotive force to inform the existence of the bicycle to a following vehicle. At this stage, the coil part 2 is provided with a reflecting plate

(passive reflector) 7 for reflecting the light when the bicycle is lighted by the light of the following vehicle, and the light emitting diode 5 is provided in this reflecting plate 7.

## [Claim(s)]

[Claim 1] (a) The coil containing an iron core fixed to the frame of a bicycle (1) (6), (\*\*) -- with the unit or two or more light emitting diodes (5) which were connected to the both ends of the coil containing an iron core (6) It is constituted. (\*\*) -- the magnet (9) fixed to the wheel of a bicycle (1) -- since -- With rotation of said wheel, a magnet (9) approaches the coil containing an iron core (6), and it passes. It has the structure where a magnetic circuit is formed between the coil containing an iron core (6), and a magnet (9) in that case. The lighting fixture for bicycles characterized by making light emitting diode (5) emit light at the moment of the coil containing an iron core (6) and a magnet (9) approaching, and passing with the power by which induction is carried out to the coil containing an iron core (6).

[Claim 2] It is the lighting fixture for bicycles by which the combination of the coil containing an iron core (6), an unit, or two or more light emitting diodes (5) was fixed to the wheel of a bicycle (1), and the magnet (9) was fixed to the frame of a bicycle (1) in claim 1.

[Claim 3] The lighting fixture for bicycles make a magnet (9) into plurality, and two or more magnets (9) approach [ lighting fixture ] the coil containing an iron core (6), and pass [ lighting fixture ] one by one during 1 rotation of the wheel of a bicycle (1) in claim 1, and it was made to make light emitting diode (5) emit light for whenever [ of said approach and passage / every ].

[Claim 4] The lighting fixture for bicycles make combination with the coil containing an iron core (6), an unit, or two or more light emitting diodes (5) into plurality, and said two or more combination approaches [ lighting fixture ] a magnet (9), and passes [ lighting fixture ] one by one during 1 rotation of the wheel of a bicycle (1) in claim 2, and it was made to make light emitting diode (5) emit light for whenever [ of said approach and passage / every ].

## [Detailed Description of the Invention]

## [0001]

[Industrial Application] This invention relates to the lighting fixture for bicycles. In order to tell a perimeter especially about transit of a bicycle, it is related with the lighting fixture of the bicycle characterized by making light emitting diode emit light using rotation of a wheel.

## [0002]

[Description of the Prior Art] For the traffic paint of a bicycle, especially the avoid accident of Nighttime, it is clear that it is effective to prepare a rear position lamp in addition to a headlight. Invention about the lighting fixture for bicycles is already partly proposed as the reflection, and utilization is tried.

[0003] First, the generator driven with a wheel about a power supply section serves as the mainstream for headlights from the former. However, recently, what uses a cell, and the thing with which the charge function by the solar battery is added further, and power consumption is compensated have also been put in practical use.

[0004] On the other hand, since a headlight does not need large luminous intensity, therefore power about a rear position lamp, a power source is made into a primary cell, or the income and outgo of power are realized also as a combination of a rechargeable battery and a solar battery. Moreover, light emitting diode could be used instead of the conventional miniature lamp also about the light source, and it also became possible

to secure sufficient check-by-looking family name with the advent of high brightness light emitting diode.

[0005] In JP, 1-119489,A, the rear position lamp which makes two or more light emitting diodes emit light intermittently by the primary cell is proposed. Moreover, publication of unexamined utility model application Showa 59-190687 is a proposal which makes a stroboscope flash lamp emit light by using a generator or a cell as a power source. In publication of unexamined utility model application Showa 60-170237, the proposal that publication of unexamined utility model application Showa 62-41242 is also the same, and the proposal which shines an electroluminescence (EL) plate with a generator makes EL plate the light source is indicated, respectively.

[0006] On the other hand, the proposal of the rear position lamp which uses combination of a rechargeable battery and a solar battery as a power source is shown by JP, 59-223532,A and publication of unexamined utility model application Heisei 1-90681. By these proposals, a pressure-sensitive switch is formed in the above-mentioned photosensor and above-mentioned seat other than a power-source method, and only when Nighttime and an operator sit on a seat, the light source emits light.

[0007] In JP, 61-110682,A and JP, 62-15181,A, a power source is the example which consisted of both combination of a generator and a rechargeable battery, and a solar battery. It is aiming at enabling it to turn on a headlight and a rear position lamp also during a halt of a bicycle by the device of the switching circuit which controls connecting both to juxtaposition to the light source, and lighting, and making PEDARINGU light.

[0008]

[Problem(s) to be Solved by the Invention] Although the generator method of a wheel drive is in use as a power source for headlights as mentioned above, there are problems, like that PEDARINGU becomes heavy at the time of a generation of electrical energy and the noise comes out in this method, and solution is desired. However, when making a power source into a primary cell, inconvenient [ of requiring a changing battery periodically ] remains. On the other hand, if a power source is constituted from a rechargeable battery and a solar battery, since a part for the power consumption in a rechargeable battery will be compensated by day ranges and the solar battery, the worries about a cell piece disappear and can be used as a power source for rear position lamps. However, it is instead desirable to add a means to detect an operator's getting on and off or a run state as the day-and-night sensor network for restricting luminescence to Nighttime, becoming indispensable, and lighting up automatically further only at the time of operation. Therefore, the control network of luminescence must become complicated and must solve reservation and the cure against a cost rise of dependability.

[0009] since it usually comes out that maintenance is hardly performed and there is generally about a bicycle, the lamplight network of a bicycle must be a sufficiently brief method. If it sees from the point, each aforementioned proposal is not necessarily practical enough, and the room of an improvement is left behind. Therefore, it is more simple and it is the technical problem of this invention to ask for a method which has check-by-looking effectiveness with unnecessarily sufficient maintenance.

[0010]

[Means for Solving the Problem] In order to solve the aforementioned

technical problem, in this invention, it carries out as follows. A power supply section consists of a magnet and a coil containing an iron core, attaches one side in the spoke or rim of a wheel, and attaches another side in the frame of a car body. Furthermore, when a wheel rotates both relative position, a magnet and the coil containing an iron core approach and it is made to pass, and magnetic flux passes between a magnet and an iron core at the time of the aforementioned approach and passage, and it arranges so that the number of magnetic flux may change.

[0011] This is connected to the light source as a load of a coil using an unit or two or more light emitting diodes (LED). According to this configuration, in a coil, a pulse voltage occurs with rotation of a wheel. And even if light emitting diode limits the magnitude of a magnet and a coil to the practical range as an example shows since it emits light also with small power, it can make light emitting diode emit light intermittently by rotation of a wheel.

[0012]

[Function] Power can occur in a coil and light emitting diode can be made to emit light intermittently for every rotation of a wheel at the time of approach of a magnet and the coil containing an iron core, and passage by the configuration and arrangement of the aforementioned magnet, the coil containing an iron core, and light emitting diode.

[0013]

[example 1: Basic form] Hereafter, the example of this patent is explained. Drawing 1 is the side elevation of the bicycle equipped with the lighting fixture of an example 1. The lighting fixture of this patent consists of the coil section (2) and the magnet section (3). The coil section (2) is attached and fixed to the frame (4) of a bicycle. The magnet section (3) is attached in the spoke (12) of a wheel, and rotates with rotation of a wheel. The spoke (12) of drawing 1 is omitted except the installation part of the magnet section (3). Drawing 2 is the front view of the coil section (2) seen from the back of a bicycle. The retroreflection plate (7) with which the bicycle is equipped is usually attached in the transverse plane of the coil section (2). A retroreflection plate (7) is a passive reflector for carrying out retroreflection of the light and making an automobilism person etc. know existence of a bicycle, when illuminated by lamplight, such as an automobile, from the back of a bicycle. Two light emitting diodes are attached in this retroreflection plate, and this is made to turn on in this example.

[0014] Drawing 3 is the expansion side elevation of the coil section (2), and drawing 4 is the expansion side elevation of the magnet section (3). Drawing 5 is the A-A side sectional view of drawing 3, and drawing 6 is the B-B side sectional view of drawing 4 when being in the mutual location which the coil section (2) and the magnet section (3) approached most. Moreover, drawing 7 is drawing in which only the coil containing an iron core (6) and the magnet (9) similarly took out and showed \*\* in the C-C side sectional view of drawing 4. The coil containing an iron core (6) is being fixed to the case (15) with a retroreflection plate (7), and the case (15) is being fixed to the frame (4) by fixing metal (8). The magnet (9) is being fixed to the magnet fixture (14) with means, such as adhesion, and the magnet fixture (14) is being fixed to the spoke (12) of a wheel by spoke presser-foot (21). Therefore, a magnet (9) rotates with rotation of a wheel. With the coil containing an iron core (6), the coil (16) is wound around this alignment in the center section of the iron core (17) which carried out E mold. By rotation of

a wheel, an iron core (17) and a magnet (9) maintain spacing which does not contact mutually, and are attached, and a magnet (9) moves them in the direction of an arrow head (18) with rotation of a wheel. A magnetic circuit is formed in a magnet (9) and an iron core (17) in drawing 7, and magnetic flux passes so that it may travel through an opening (20). If a magnet (9) furthermore moves, since the number of magnetic flux will change, it is [Equation 1] by the right-hand rule of Fleming.

$$e = -N (d\Phi / dt)$$

e : 電圧

$\Phi$  : 磁束

N : コイルの巻数

$d / dt$  : 時間微分

It is alike and induction of the electrical potential difference shown is carried out to the both ends of a coil (16).

[0015] Drawing 8 is a circuit connection diagram. To the both ends of the coil containing an iron core (6), a polarity is made reverse and two light emitting diodes (5) are connected to juxtaposition. Whenever a magnet (9) passes the coil containing an iron core (6), short-time lighting is carried out, and time of day shifts a little, and it turns on two light emitting diode [one] (5) at a time. That is, when a magnet (9) approaches the coil containing an iron core (6), one piece lights up, and when keeping away, other one piece lights up. However, light emitting diode is usually [Equation 1]. The light is not switched on, unless it is alike and the electrical potential difference shown exceeds about 1.5 volts.

[Equation 1] It is alike, and the electrical potential difference shown becomes high, so that there are so many numbers of turns of a coil that flux density is high, and, so that relative velocity in case a magnet (9) passes the coil containing an iron core (6) is large.

[0016] Next, the data of an experimental result are explained. Drawing 9 shows the voltage waveform of the both ends of the coil containing an iron core (6). The wave of the dotted line in drawing is a wave when not connecting two light emitting diodes. Drawing 10 is the current wave form where it flows to light emitting diode. A wave-like negative side and each by the side of forward are the currents which flow to each light emitting diode. These experiments are obtained, when about 3mm opening is maintained by 20\*10 (mm) and the coil containing an iron core (6) which made about 2000 times of winding E mold iron core of the laminating silicon steel hill of thickness 10 (mm) by 28\*20 (mm) is made to pass the alnico magnet of thickness 5 (mm) with the relative velocity of about 80 cm/S. Said relative velocity is equivalent to vehicle speed about 8 km/h, when the coil section (6) is attached in a frame (4) from a wheel center in the location of 25cm. High brightness mold light emitting diode is brightly turned on with an about 1mA current. Since about 12mA current is acquired, light emitting diode (5) can be made to turn on from said rate to a low-speed area more in this experimental result. On the contrary, at the time of high-speed transit of a bicycle, about worries that a current may flow too much to light emitting diode, since an instant, i.e., duty REITO, is [lighting time amount] small in this patent, the

worries do not almost exist. What is necessary is to reduce the number of turns of the coil of the coil containing an iron core (6), or just to increase an opening (20), in being anxious about the excessive current at the time of high-speed transit. Moreover, as shown by the dotted line of drawing 8, while reducing the peak value of the current which flows to light emitting diode by connecting a capacitor (22) to light emitting diode (5) at juxtaposition, lighting time amount can be prolonged.

[0017] Although the number of light emitting diodes (5) was made into two pieces in said example, the number of light emitting diodes (5) can also be made into one piece as a circuit as shown in drawing 11. The diode for rectification (23) is used in order to avoid the reverse voltage which joins light emitting diode (5). When the generated voltage of the coil containing an iron core (6) is lower than the reverse proof-pressure value of light emitting diode (5), the diode for rectification (23) can be omitted.

[0018] Moreover, in said example, although the number of the magnet sections (3) was one, they can make [ two or more ] this number, and they can carry out multiple-times lighting of the light emitting diode during 1 rotation of a wheel.

[0019] Furthermore, although the rear wheel of a bicycle (1) was equipped and being used as a rear position lamp in said example, a front wheel can be equipped with this and it can also consider as a headlight. existence of a bicycle is got to know although a light effect is not expectable -- making -- it is effective. In addition, since red has a common idea with a rear position lamp in this case, the color of light emitting diode is good to make it yellow or green.

[0020] Although the configuration of an iron core was made into E form in said example, if only a magnetic circuit is formed like the above, of course, the iron core of what kind of configuration may be used. In said example, although the number of the light emitting diodes (5) linked to the coil containing an iron core (6) was [ 1 thru/or ] two, as long as allowances are in the power by which induction is carried out to a coil, it may be increased to three or more pieces.

[0021] [Example 2:coil rotation mold] Drawing 12 is the side elevation of the bicycle (1) equipped with the lighting fixture of an example 2. In the example 2, the magnet section (3A) is being attached and fixed to the frame (4), and the coil section (2A) is attached in the spoke of a wheel, and rotates with a wheel. Compared with an example 1, it is the same except the physical relationship of attachment of the magnet section and the coil section being reverse. Drawing 13 is the expansion side elevation of the magnet section (3A), and drawing 14 is the expansion side elevation of the coil section (2A). Moreover, drawing 15 is the D-D side sectional view of drawing 14 when being in the mutual location which the coil section (2A) and the magnet section (3A) approached most. The retroreflection plate (7) is attached in the magnet section (3A) towards the back of a bicycle (1), and the magnet section (3A) is being attached and fixed to the frame (4). The coil containing an iron core (6) and two light emitting diodes (5) are built in the coil section (2A). Two light emitting diodes (5) are attached so that light may be emitted to the side of a bicycle (1), and when the coil section (2A) approaches the magnet section (3A), they emit light, rotating. Of course, the luminescence direction of light emitting diode (5) is not restricted to the side of a bicycle (1), and can do back, the front, etc. in the favorite direction. The circuit connection diagram of an example 2 is

the same as drawing 8 of an example 1.

[0022] Moreover, the number of light emitting diodes (5) can also be made into one piece by the circuit of drawing 11. In said example, although the number of the coil sections (2) was one, they can make [ two or more ] this number, and they can carry out sequential lighting of the light emitting diode (5) of two or more coil sections (2) during 1 rotation of a wheel. Moreover, a front wheel can also be equipped although the rear wheel of a bicycle (1) was equipped with this lighting fixture in said example.

[0023]

[Effect of the Invention] When a magnet is attached in the spoke or rim of a wheel, and the unit or two or more light emitting diodes which were connected with the coil containing an iron core at this are attached in the frame of a car body and a wheel rotates, since light emitting diode emits light intermittently for every approach of a magnet and the coil containing an iron core, and passage by adjusting both relative position so that magnetic magnetic flux may pass along the iron core of the coil containing an iron core, this lighting fixture can be used as a lighting fixture for bicycles. Although luminescence of light emitting diode is intermittent, there is effectiveness in raising the visibility from a perimeter rather. Arrangement of a magnet and a coil is carried out the above and reversely, and if a magnet is attached in a frame and a coil is attached in a spoke, it can be visible from the side face of a bicycle in luminescence of light emitting diode. A generation of electrical energy takes place only once for every magnet of a pair, approach of a coil, and passage, and since the power is minute, \*\* DARINGU does not become heavy by attachment of this lighting fixture.

[Brief Description of the Drawings]

[Drawing 1] It is the side elevation of the bicycle (1) equipped with the lighting fixture of an example 1.

[Drawing 2] It is the front view of the coil section (2) seen from the back of a bicycle (1).

[Drawing 3] It is the expansion side elevation of the coil section (2).

[Drawing 4] It breaks by the magnetic (3) expansion side elevation.

[Drawing 5] It is the A-A side sectional view of drawing 3.

[Drawing 6] It is the B-B side sectional view of drawing 4 when being in the mutual location which the coil section (2) and the magnet section (3) approached most.

[Drawing 7] In the C-C side sectional view of drawing 4 when being in the mutual location which the coil section (2) and the magnet section (3) approached most, it is drawing having taken out and shown the coil containing an iron core (6), and the magnet (9).

[Drawing 8] It is a circuit connection diagram.

[Drawing 9] It is data of an experimental result and the voltage waveform of the both ends of the coil containing an iron core (6) is shown.

[Drawing 10] It is data of an experimental result and is the current wave form where it flows to light emitting diode (5).

[Drawing 11] It is a circuit connection diagram in the case of making the number of the light emitting diodes (5) linked to the coil containing an iron core (6) into one piece.

[Drawing 12] It is the side elevation of the bicycle (1) equipped with the lighting fixture of an example 2.

[Drawing 13] It is the expansion side elevation of the magnet section

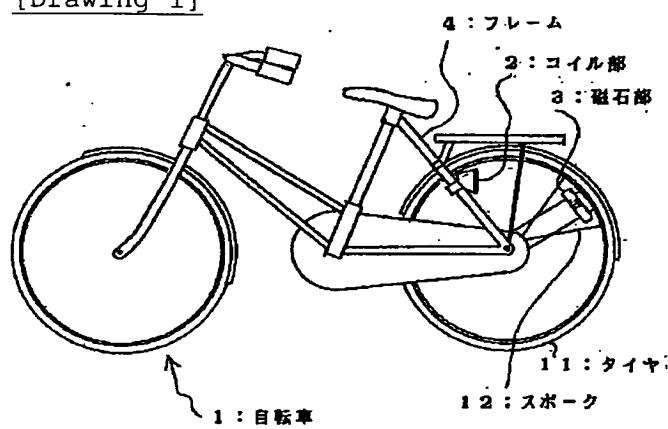
(3A).

[Drawing 14] It is the expansion side elevation of the coil section (2A).  
 [Drawing 15] It is the D-D side sectional view of drawing 14 when being in the mutual location which the coil section (2A) and the magnet section (3A) approached most.

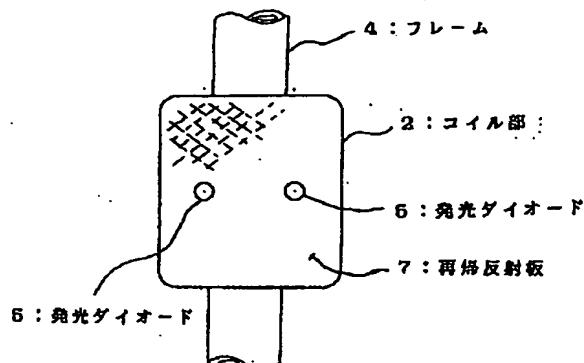
[Description of Notations]

- 1 Bicycle
- 2 2A Coil section
- 3 3A Magnet section
- 4 Frame
- 5 Light Emitting Diode
- 6 Coil Containing Iron Core
- 7 Retroreflection Plate
- 8 Fixing Metal
- 9 Magnet
- 10 Casing
- 11 Tire
- 12 Spoke
- 13 Rim
- 14 Magnet Fixture
- 15 Case
- 16 Coil
- 17 Iron Core
- 18 Arrow Head
- 19 Tire Covering
- 20 Opening
- 21 Spoke Presser Foot
- 22 Capacitor
- 23 Diode for Rectification

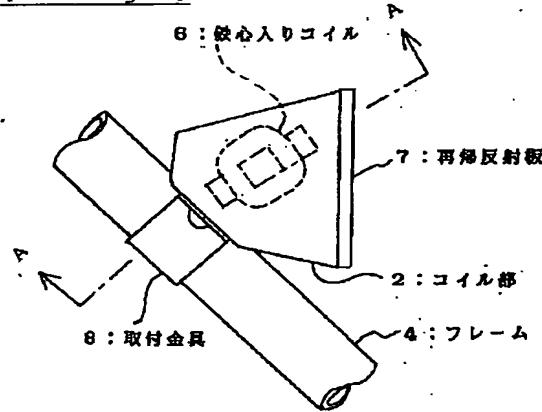
[Drawing 1]



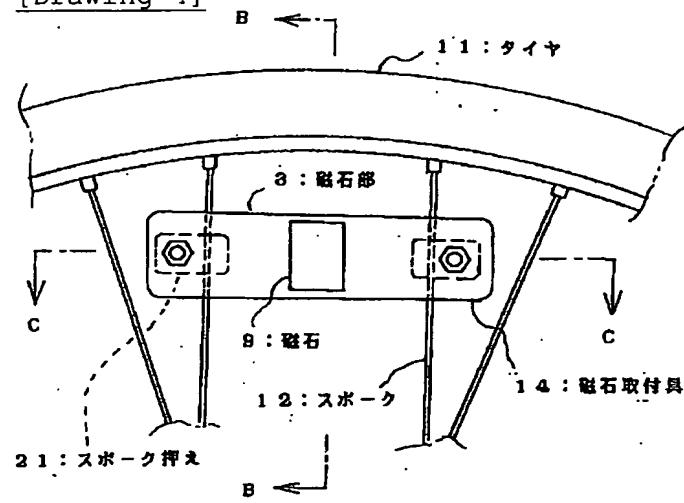
[Drawing 2]

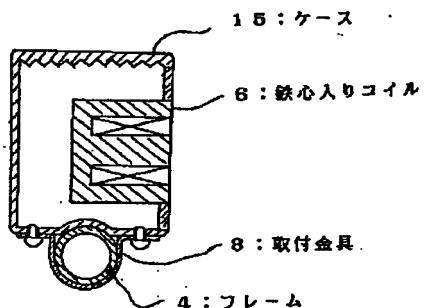
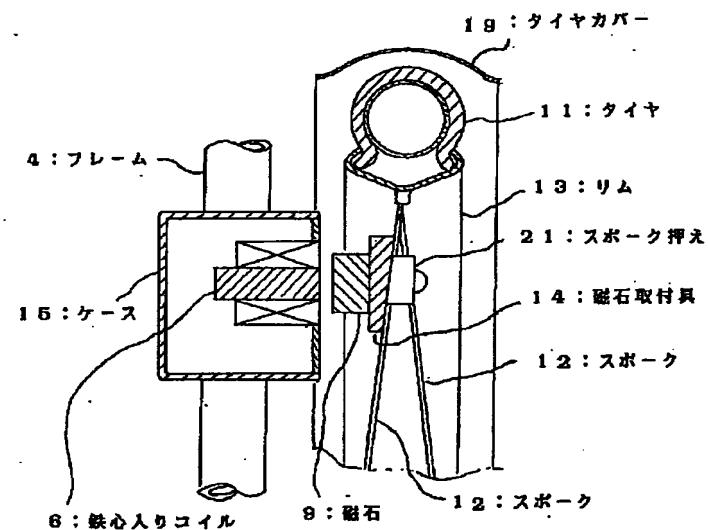
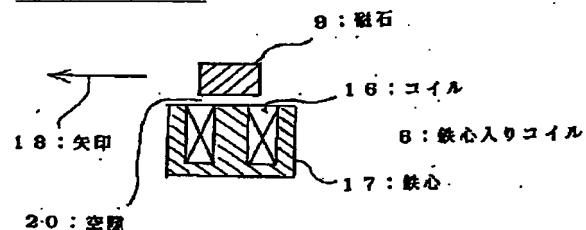
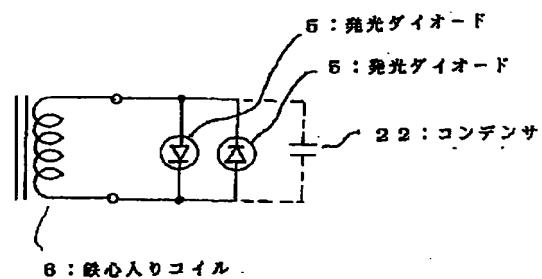


[Drawing 3]

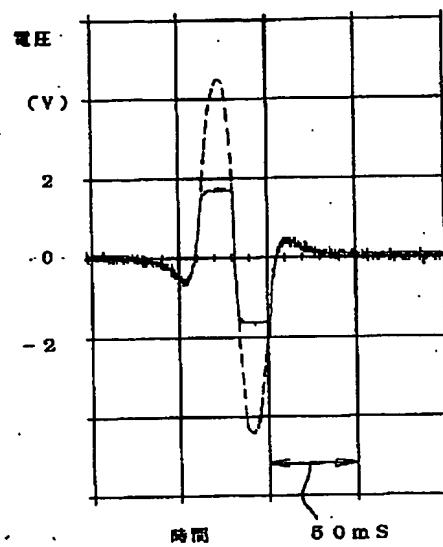


[Drawing 4]

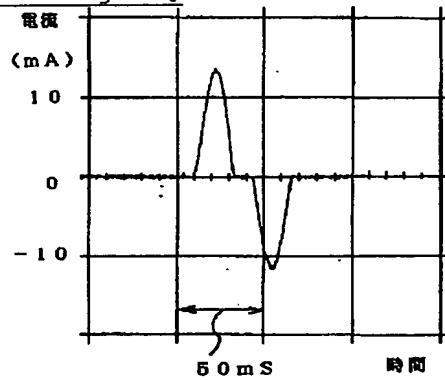


[Drawing 5][Drawing 6][Drawing 7][Drawing 8]

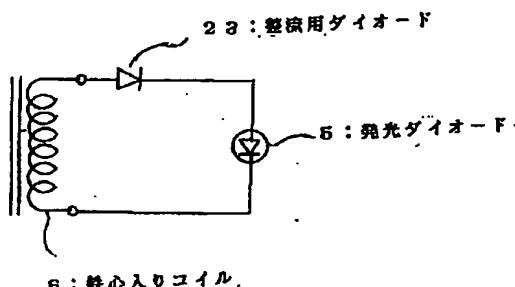
[Drawing 9]



[Drawing 10]

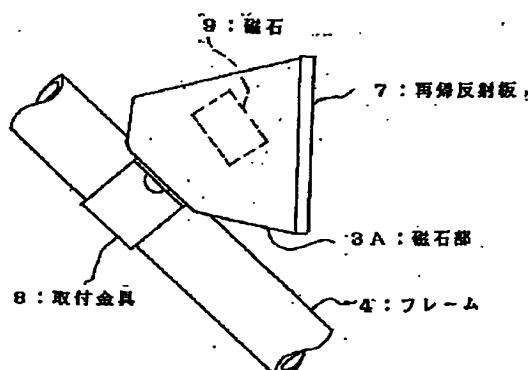
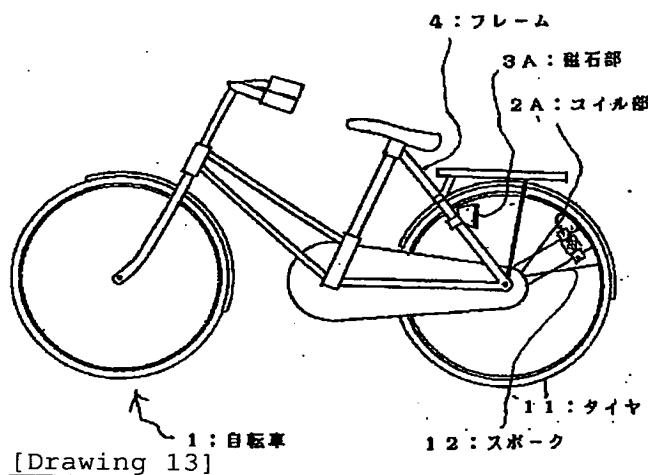


[Drawing 11]

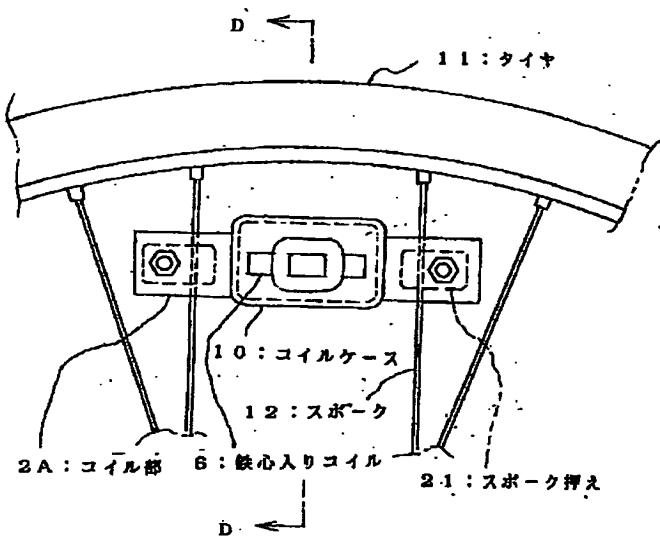


6: 鉄心入りコイル.

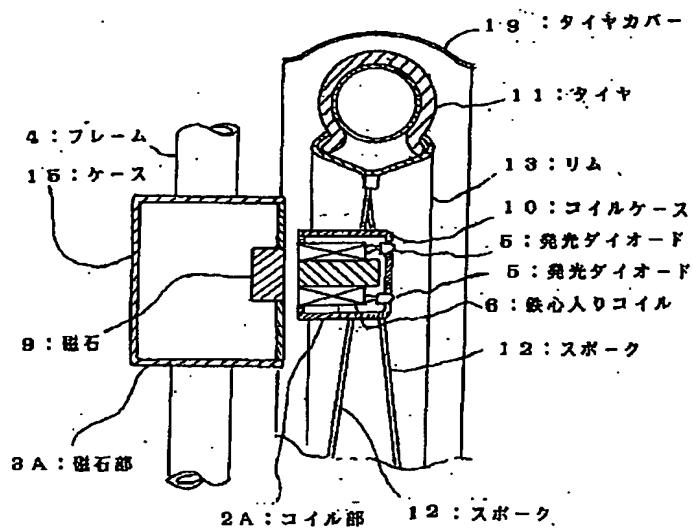
[Drawing 12]



[Drawing 14]



[Drawing 15]



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